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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/788,556
Filing Date: February 27, 2004
Appellant(s): BEYER, KEVIN S.

Patrick A. Darno
<u>For Appellant</u>

EXAMINER'S ANSWER

This is in response to the appeal brief filed June 20, 2007 appealing from the Office action

mailed September 29, 2006.

(1)   Real Party of Interest

A statement identifying the real party interest in contained in the brief.

(2)   Related Appeals and Interferences

The Examiner is not aware of any related appeals, interferences, or judicial proceedings,

which directly affect or be affected by or have a bearing on the Board's decision in the pending

appeal.

(3)   Status of Claims

The statement of the status of claims contained in the brief is correct.

(4)   Status of Amendments After Final

There are no unentered amendments.

(5)   Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6)   Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7)   Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) ꞏ Evidence Relied Upon

US 5,806,075   Jain et al.   09/08/1998

(9)   Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections – 35 U.S.C- 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1-39 and 50-87 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1 and 50, recite the limitation "**at least in part**" renders the claim indefinite because neither the claim nor the specification explains what "at least in part" means. It is difficult for the examiner to interpret the claim not knowing how the limitation "at least in part" constitutes. Claims 2-39 and 50-87 are also rejected by virtue of their dependency to claims 1 and 50.

Claim Rejections – 35 U.S.C 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-5, 7-47, and 50-88 are rejected under 35 U.S.C. 102(b) as being anticipated by Jain et al (US Patent No. 5,806,075, Date of Patent: September 8, 1998).

Claims 1 and 50:

Regarding claims 1 and 50 discloses a computer-implemented method/computer readable medium, **utilizing** the same functionality/claim limitations, **Jain** teaches a computer-implemented method/computer readable medium for providing convergence of **multiple** copies **of a table to a same state** in a database system (Figure 1, all features, illustrates computerized systems containing one or more

locations containing copies of data, Jain), the database system including a plurality of nodes **each having**

a corresponding copy of the table, the method (Figure 3, illustrates a plurality of replication tables,

Jain), comprising:

for each row of each table copy (Figures 8A and 8B, all features and defined in column 17,

lines 7-53, wherein applicant specification paragraph [0026] to be each row of each table copy is

augmented with additional information used to facilitate the convergence of replicated data and

wherein FIG. 2 illustrates an embodiment of a table copy row with the additional information in

accordance with the present invention and the additional information comprises a Timestamp

201, a CopyId 202, CopyDelete flag 203, and an ImplicitDelete flag 204, Jain);

associating a timestamp with the row, the timestamp indicating a time when a change to the

row has occurred (Figure 10, wherein commit time is defined, and wherein it illustrates the state of

replication tables after queue_transactional_DRPC has processed the replicated procedure information

and column 18, lines 51-53, wherein any changes made to the tables at the DbA site must be replicated at

the DbB site and vice versa, Jain);

associating a copy identification to the row, the copy identification being an identifier that

uniquely identifies the table copy to which the row belongs (Figure 10, all features, wherein the figure

is defined in column 19, lines 17-33, wherein identifies a replicated procedure, wherein the transaction

table is populated with a transaction identifier to identify the order processing transaction, wherein the

transaction nodes table has one entry for the remote copy of the inventory orders tables located in DbB,

wherein the entry is equivalent to the row, Jain); **and**

associating propagation controls with the row (column 20, lines 17-25, wherein the entry is

deleted from the replication tables; column 21, lines 53-56, wherein deleted from the call nodes table;

column 22, lines 20-22, wherein it provides the ability for an application to identify conflicts within one

of its procedures, lines 24-25, wherein when a conflict is detected, information regarding the conflict can

be identified and stored in the exceptions table and wherein applicant specification, paragraph [0059],

propagation controls comprise a delete label and a conflict label and the delete label indicates

that a deleted row should not be communicated to the other table copies and the conflict label

indicates that a row delete should be communicated to the other table copies, Jain), **the**

propagation controls indicating whether a change to the row should be communicated to other

table copies based at least in part on the timestamp of the change or the copy identification

associated with the row (Figure 11B, all features, wherein the figure is defined in column 21, lines 46-60

and column 22, lines 1-14, Jain);

asynchronously capturing **a** change to **a** row of **a given table copy** from a database

recovery log (column 7, lines 7-36, wherein recovery log, i.e. redo log contains undo information,

wherein information that can be used to roll back changes made to data after an event, such as system

failure, when such error occurs the transactional updates made prior to the error, must be undone to

maintain the data integrity in existence prior to the updates and although the redo log the redo log was

not designed for capturing modification information for propagation to a second database system

and when the log is used for its intended purpose as well as a resource for data replication, a

storage management problem arises, because a redo log that it used to retain propagation

information can never be moved off-line, i.e., made inaccessible to the database system which is

equivalent to capturing a change to a row of a given table copy and provides a propagation

identification capability that can be managed in the same way as any other table, or relation,

managed by a database administrator an the ability to encode the propagation information in

tables in the database system and the information stored in these tables can be retrieved as any

other data within the database system, and can be accessed at any time, which is also **equivalent**

to capturing a change, Jain), **the database recovery log containing an entry that describes the change to row of the given table copy** (column 7, lines 65-67, Jain);

determining that the captured change **to the row if the given table copy** is to be communicated to **other** table copies **in the database system, the determination being made in accordance with the indication of the propagation controls associated with the change row of the given table copy**; (column 7, lines 37-45. wherein data modification to other data sites, and wherein the tables include transactions, transaction nodes, call, call-nodes, and exceptions; column 18, lines 27-46, Jain);

communicating the captured change to the **other** table copies **in the database system** (column 18, lines 46-53, wherein application that use user procedure level replication to replicate it's logical operations to other sites, wherein the application assumes the relation, i.e. tables, described in Figures 2A-2D and column, 7, lines 50-64, wherein the transaction table contains information that are performed on the data and that use deferred remote procedure calls, i.e. DRPC's, such as transaction identifier, i.e. transaction_id, delivery order number, i.e. DON, start time, deferring user identifier, and destination list, Jain); and

applying the communicated change to the **other** table copies **in the database system** (column 6, lines 65-66, Jain), wherein **each table copy in the database system converges to a same state** (column 18, lines 51-53, Jain).

Claims 2, 41, and 51:

Regarding claims 2, 41, and 51, teaches wherein the **timestamp comprises a** monotonic number **having** a non-decreasing time value, wherein the time values for each of the **table copy is** in a common time base (Figure 3, wherein transaction table is illustrated, and within that table defines a start time for each transaction, wherein this is interpreted to be a non-decreasing time, Jain).

Claims 3, 42, and 52:

Regarding claims 3, 42, and 52, Jain teaches wherein **associating a timestamp with the row includes associating the timestamp with the row** in response to a user-induced change **of the row** (column 8,lines 6-14, wherein the time field is interpreted to be the monotonic number, i.e. timestamp as defined in applicant specification on page 17, line 3, wherein it reflects the time that the transaction was started, deferring the user field identifies the user who initiated the deferred transaction procedure call, Jain).

Claims 4, 43, and 53:

Regarding claims 4, 43, and 53, Jain teaches wherein the copy **identification uniquely identifying** each **table copy has** an ordering property (Figure 2B-2C and 2D1-2D2, all features, wherein ordering property is defined, Jain).

Claims 5, 44, and 54:

Regarding claims 5, 44, and 54, Jain teaches wherein **associating a copy identification to the row includes associating the copy identification to the row** in response to a user induced change **of the row** (column 11, lines 10-19, wherein the order of modifications is crucial, the DON, i.e. document order number can be used to retain the modification order and the DON field is assigned a original transaction, the time field of the new transaction table entry is set to the current time, the deferring user identifier is assigned the value of the user that originated the original transaction, Jain)

Claims 6, 45, and 55:

Regarding claims 6, 45, and 55, Jain teaches wherein the propagation controls comprise a delete label and a conflict label (column 6, lines 57-63, wherein a trigger is a procedure that is executed when a modification, e.g. update, insert, or delete, occurs to a row in table and column 22, lines 18-22, wherein identify conflicts of procedures is defined, Jain).

Claims 7, 46, and 56:

Regarding claims 7, 46, and 56, Jain teaches wherein the delete label indicates that a row delete in **a given table copy** is <u>not</u> to be communicated to **other** table copies **in the database system** (column 16, lines 28-32, wherein the remote table entry is deleted from the remote table, after the delete replication variable is reset at processing block, and wherein the processing ends at block, i.e. interpreted to be the plurality of table copies, Jain).

Claims 8, 47, and 57:

Regarding claims 8, 47, and 57, Jain teaches wherein the conflict label indicates that an implicit row delete in **a given table copy** is to be communicated to **other** table copies **in the database system, an implicit row delete being a deletion of a row due to a conflict** (column 14, lines 22-26 and column 22, lines 7-14, Jain).

Claims 9 and 58:

Regarding claims 9, 58, Jain teaches wherein **asynchronously** capturing **a change to a row of a given table copy** comprises:

accessing **the** entry of the database recovery log pertaining to the change **of the row** (column 8, lines 38-43, wherein transaction is to be executed to replicate changes made by the transaction on the local data site and transaction_id can be used to access an entry in the transaction table, Jain);

determining a type **of change to the row;** (column 8, lines 55-61, wherein procedures can be defined without being a part of a transaction and information regarding a either type of procedure is retained in the calls table, the calls table contains a unique identifier, call identifier, i.e. call_id, that can order a call within a transaction, Jain);

extracting old column values and new column values of the **row** from the **entry in the** database recovery log (column 14, lines 3-14, wherein the old values, or a subset, uniquely identify the row that is the target of the modification, and wherein the update operation is performed, the old values would be use

to detect conflicts, and wherein the old value of the local data and the current values at the remote site

may indicate that separate operation has been performed, Jain); and

extracting changed key column values and unchanged key column values **associated with the**

row from the **entry in the** database recovery log (column 17, lines 57-63, wherein concurrent updates are

made to disjoint sets, wherein in disjoint sets is interpreted to be a method of extracting, of non primary

key columns, lost updates are prevented only when the updates are to columns whose values have been

changed, i.e. those column changed at the originating sites as indicated by a difference between the

old_value and new_value parameters and column 15, lines 23-25, wherein concurrent modifications to

disjoint sets of non-primary field values can be permitted, Jain).

Claims 10 and 59:

Regarding claims 10 and 59, Jain teaches wherein the type of change **to the row** comprises a row

insert (Figure 5A, diagram 504, Jain), a row delete (Figure 5C, diagram 574, Jain), a non-key update

(column 15, lines 23-28, wherein non-primary field values is interpreted to be the non-key update, Jain),

or a key update (Figure 5C, diagram 564, wherein row entry to be update using primary key value, e.g.

subset of old values, and wherein < table_name > delete, i.e. old_values, illustrated at the top of Figure

5C as well is defined as the executing point, as defined in applicant specification on page 35, lines 6-7,

states the key update is modeled as a deletion of the row with the old key value and insertion of a row

with the new key, Jain).

Claims 11 and 60:

Regarding claims 11 and 60, Jain teaches wherein the determining **that the captured change to**

the row of the given table copy is to be communicated to other table copies in the database system

comprises:

examining **the type of change to the row if the given table copy,** the copy identification

associated with the row of the given table copy, and the propagation **controls associated with the row**

of the given table copy (REFER to claim 1, wherein this limitation has been addressed, Jain), wherein

the propagation control values comprises a delete label and a conflict label (REFER to claim 6, wherein

this limitation has been addressed, Jain)

Claims 12 and 61:

Regarding claims 12 and 61, Jain teaches wherein the determining further comprises:

determining that the captured change to the row of the given table copy is to be communicated

to other table copies in the database system responsive to,

the type of change to the row being a row insert (Figure 5B1, diagram 534 and 5BC, diagram

570, wherein each field value is equal to its corresponding, or not equal to the corresponding new_value

parameter, Jain); and

the copy identification associated with the row being the same as a copy identification assigned

to the given table copy (column 11, lines 1-7, wherein a current transaction identifier is assigned to the

transaction to be stored in the tables, the current transaction is assigned a value that will uniquely identify

the table entry, Jain).

Claims 13 and 62:

Regarding claims 13 and 62, Jain teaches wherein determining that the captured change to the

row of the given table copy is to be communicated to other table copies in the database system

further comprises:

determining that the captured change to the row if the given table copy is to be communicated

to other table copies in the database system responsive to, the type of change to the row being a row

delete (Figure 5C, diagram 574, Jain) and the delete label associated with the row indicating that the

captured change is to be communicated to the other table copies in the database system (column 16,

lines 28-32, wherein the delete operation is performed on the remote table, the global replication variable

is reset at processing block, Jain).

Claims 14 and 63:

Regarding claims 14 and 63, Jain teaches wherein determining **that the captured change to the row of the given table copy is to be communicated to other table copies in the database system** further comprises:

determining that the captured change **to the row of the given table copy** is to be communicated to **other** table copies **responsive to**, the type **of change to the row being** a non-key update (column 15, lines 27-28, wherein updates can be applied to non-primary fields, and Figure 11A and 11B, all features, illustrates a execution of transactional interpreted to be primary key transactions, non-transactional procedures interpreted to be non-primary transactions, Jain) <u>or</u> a key update (column 16, lines 53-55, wherein assigned to the inventory update transaction, wherein transaction_id is the primary key for the transaction table defined in column 7, lines 60-63, Jain) ;

neither the delete label nor the conflict label **associated with the row** indicates that the captured change is <u>not</u> to be communicated **to other table copies in the database system** (columns 21-22, lines 63-67, and liens 1-4, wherein updates that have occurred to a remote copy to the date may be lost, if the replicated modifications overwrites the current values in the remote copy, wherein the ability to communicate an exception to rollback any changes to a data copy after an exception is detected, Jain); and

a new copy identification **associated with the row being the same as the** copy identification assigned to **the given** table copy (column 22, lines 32-39, wherein the exceptions table further contains the call identifier of the current calls table entry being processed along with the destination node, i.e. remote copy location, Jain).

Claims 15 and 64:

Regarding claims 15 and 64, Jain teaches wherein communicating **the captured change to the other table copies in the database system** comprises:

sending information for **associated with** the captured change to the **other** table copies in the

database system (column 7, lines 38-43. wherein DRPC, i.e. deferring remote process control is

interpreted to be sending, wherein DRPC is implementing the client server model of distributing

computing, which is a request is sent to a remote system to execute a designated procedure using

arguments supplied and a result returned to the caller, Jain), wherein **responsive** to the **type of** change **to**

the row being a row insert (column 14, lines 16-18, Jain), the information **associated with the captured**

change comprises key column values (column 17, lines 26-32, wherein the values are defined, Jain), non-

key column values (column 17, lines 59-61, wherein non-primary key columns, and updates are to

columns whose values have been changed, Jain), a **timestamp** (REFER to claim 1, wherein this limitation

has been addressed, Jain), and a copy identification **associated with the row of the given table_copy**

(column 18, lines 51-53, wherein any changes made to the tables at the DbA site must be replicated at the

DbB site, and vice versa, Jain).

Claims 16 and 65:

Regarding claims 16 and 65, Jain teaches wherein communicating **the captured change to the**

other table copies in the database system comprises:

sending information **associated with** the captured change to the **other** table copies **in the**

database system, wherein **responsive to** the captured change **type of** change **to the row being** a row

delete (Figure 5C, diagram 574, Jain), the information **associated with the captured change** comprises

key column values (REFER to claims 15 and 64, wherein this limitation has been addressed, Jain), a

timestamp (see claim 1, wherein this limitation has already been addressed, Jain), and a copy

identification **associated with the row of the given table copy** (REFER to claims 16 and 65, wherein

this limitation has already been addressed, Jain).

Claims 17 and 66:

Regarding claims 17 and 66, Jain teaches wherein communicating **the captured change to the other table copies in the database system** comprises:

sending information for **associated with** the captured change to the **other** table copies **in the database system**, wherein **responsive to** the **type of** change **being** a non-key update (column 6, lines 57-61, wherein the trigger is interpreted to be the capture, and wherein trigger is a procedure that is executed when a modification occur to a row in a table, column 12, lines 58-64, wherein trigger is initiated when any modification operation is performed on table, an operation that is performed on a remote data entry will result in the initiation of a second trigger, and wherein defined in the applicant specification on page 23, lines 10-12, wherein non-key or key update is setting the copying identification of the updated row in the target table copy to the copy identification received with the communicated change, Jain), the information **associated with the captured change** comprises key column values (column 17, lines 26-32, Jain) wherein values are defined, Jain), new non-key column values (column 17, lines 26-32, wherein new values is defined, Jain), an old **timestamp** (column 4, line 8, Jain), a new **timestamp** (column 4, line 8, Jain), an old copy identification (column 6, 35-44, Jain), and a new copy identification **associated with the row of the given table copy** (column 6, 45-49, Jain).

Claims 18 and 67:

Regarding claims 18 and 67, Jain teaches wherein communicating **the captured change to the other table copies in the database system** comprises:

sending information for **associated with** the captured change to the **other** table copies **in the database system**, wherein **responsive to** the **type of** change **being** a key update, the information **associated with the captured change** comprises old key column values, new key column values, new non-key column values, an old **timestamp**, a new **timestamp**, an old copy identification, and a new copy

identification **associated with the row of the given table copy** (REFER to claims 17 and 66, wherein

these limitations have already been addressed, Jain).

Claims 19 and 68:

Regarding Claims 19 and 68, Jain teaches wherein applying **the communicated change to the**

other table copies in the database system comprises:

detecting a conflict for the communicated change with a row of a target table copy, **the target**

table copy being a table copy among the other table copy in the database system at which changes

are to be replicated;(column 10, lines 8-15, wherein multiple conflicting updates may occur to different

copies of replicated data, wherein one transaction, T1, can update one copy of record A, C1, and a second

transaction, T2, can update a second copy of record A, C2, if T1 is propagated to C2, T1 can overwrite

T2's update and vice versa, wherein the present invention detects this type of execution, Jain);

determining a priority for the communicated change **responsive to** the conflict **being** detected

(column 22, lines 18-22, Jain); and

changing **the row of** target table copy in accordance with the detected conflict and the determined

priority for the communicated change (REFER to e2, wherein this limitation has been address, Jain),

wherein the changing comprises:

Claims 20 and 69:

Regarding claims 20 and 69, Jain teaches wherein the detecting **a conflict for the communicated**

change with a row of a target table copy comprises:

responsive to the type of the communicated change **being** a row delete (Figure 5C, all features,

wherein the change is communicated and wherein diagram 574, delete the row at the remote site, Jain),

the conflict is detected **responsive to,**

no row of the target table copy (Figure 5B1, diagram 526, wherein row found at remote site, if no, Jain) with key column values **associated with** the communicated change is identified (Figure 5B1, diagrams 534, wherein corresponding is interpreted to be matching column level, Jain); **or**

for a row of the target table copy with key column values matching the key column values **associated with** the communicated change (Figure 5B1, diagrams 536, wherein corresponding is interpreted to be matching row level, Jain):

a **timestamp associated with** the row of the target table copy does **not** match the **timestamp associated with** the communicated change (Figure 5B1, diagrams 534, wherein no, is interpreted to be not matching, Jain); **or**

a copy identification of the row of the target table copy does **not** match a copy identification **associated with** the communicated change (Figure 5B1, diagrams 536, wherein no, is interpreted to be not matching, and wherein matching is interpreted to be a method of corresponding, Jain).

Claims 21 and 70:

Regarding claims 21 and 70, Jain teaches wherein detecting **a conflict for the communicated change with a row of a target table copy** further comprises:

responsive to the communicated **type of the** communicated change **being** a row insert, the conflict is detected (columns 22-23, line 67 and lines 10-14, wherein conflict is detected and wherein modifications includes the update, delete, and insert operations, Jain) **responsive to,**

a row of the target table copy with key column values matching key column values **associated with** the communicated change is identified (Figure 5B1, diagrams 536, wherein corresponding is interpreted to be matching row level, Jain).

Claims 22 and 71:

Regarding claims 22 and 71, Jain teaches wherein detecting **a conflict for the communicated change with a row of a target table copy** further comprises:

responsive to the **type of the** communicated change **being** a non-key update_ (REFER to claims 10 and 59, wherein this limitation has been addressed, Jain), the conflict is detected **responsive to**:

no rows of the target table copy with key column values matching key column values of the communicated change is identified (Figure 2D1, all features, wherein before replication is defined and illustrates Database A and Database B, and wherein the rows aren't matched, Jain); **or**

for a row of the target table copy with key column values matching the key column values **associated with** the communicated change (Figure 2D1, all features, wherein after DBB=> DBA replication is illustrated, and Database B, before the replication and Database A, after replication have the same column values, i.e. matches, and wherein the headings of item and quantity on hand are identified, the rows are matched, Jain):

timestamp associated with the row of the target table copy does **not** match an old **timestamp associated with** of the communicated change (Figure 2D1, all features, wherein after DBB=> DBA replication is illustrated, Database A and Database B, wherein widget is interpreted to be the monotonic number, wherein the numbers aren't the same, Jain); **or**

a copy identification of the row of the target table copy does **not** match old copy identification **associated with** the communicated charge (Figure 2D2, all features, wherein AFTER DBA=>DBB replication is illustrated, and wherein Database A is interpreted to be the old copy, and Database B is , interpreted to be the copy identification of the row of the target table copy, wherein the rows are different, i.e. site indicates DB_A and DB_B, Jain).

Claims 23 and 72:

Regarding claims 23 and 72, Jain teaches wherein detecting **a conflict for the communicated change with a row of a target table copy** further comprises;

responsive to the **type of the** communicated change **being** a key update, the conflict is detected **responsive to,** no row of the target table copy with key column values matching old key column values of

associated with the communicated change is identified (Figure 2D1, all features, wherein before replication is illustrated as well as defined, Database A and Database B, the row table aren't matched nor is the communicated change, interpreted to be wherein the inventory columns are identified, Jain); **or**

for a row of the target table copy with key column values matching the old key column values **associated with** the communicated change (column 18, lines 1-8 and Figure 2D1, all features, wherein before replication is defined and illustrates Database B and after DBB=>DBA replication, wherein Database B is defined, the row communicated, wherein the modifications are matched in the local to the remote sites and Database B, Jain):

a **timestamp associated with** of the row of the target table copy does **not** match an old **timestamp associated with** the communication change (column 10, lines 11-15 and Figure 2D1, all features, wherein after DBB=> DBA replication is illustrated, Database A and Database B, wherein widget is interpreted to be the monotonic number, wherein the numbers aren't the same, Jain); **or**

a copy identification **associated with** the row of the target table copy does **not** match an old copy identification **associated with** the communicated change (Figures 2B, diagrams 120 and 130 and Figure 2C, diagrams 120 and 130 further defined in column 18, lines 53-57, wherein a decrease in inventory by the quantity ordered and entry is inserted in the orders tables to retain information and replicated, i.e. in Figure 2C and Figure 2D2, all features, wherein AFTER DBA=>DBB replication is illustrated, and wherein Database A is interpreted to be the old copy, and Database B is interpreted to be the copy identification of the row of the target table copy, wherein the rows are different, i.e. site indicates DB_A and DB_B, Jain); **or**

a row of the target table copy with key column values matching new key column values **associated with** the communicated change is identified (Figure 2D1 all features, wherein DBB=>DBA, illustrates a row, wherein DB_B is communicated to Database A and column 18, lines 1-8, Jain).

Claims 24 and 73:

Regarding claims 24 and 73, Jain teaches wherein the **communicated change to the other table copies in the database system** comprises:

assigning priority to the communicated change (columns 10-11, line 65-67 and lines 1-5, Jain), **responsive to** no conflict **being** detected **between the communicated change and the row of the target table copy** (Figure 9B, diagram 920, wherein whether or not a discrepancy is detected or not, further defined in column 19, lines 56-57, Jain).

Claims 25 and 74:

Regarding claims 25 and 74, Jain teaches wherein the determining comprises:

assigning priority to the communicated change **responsive to** the **type of the** communication change **being** a row insert (column 13, lines 21-22, wherein modification entry is inserted in replication tables, Jain);

and

timestamp associated with of the communicated change is greater than a **timestamp associated with** the conflicting row in the target table copy (columns 18-19, lines 65-67 and lines 1-2, Jain); <u>or</u>

timestamp associated with of the communicated change is equal to the **timestamp associated with** of the conflicting row (column 16, lines 24-28, wherein the field value, interpret to be monotonic number, is equal to its corresponding old value parameter and column 18, lines 8-10, Jain), and a copy identification **associated with** the communication change is greater than a copy identification **associated with** the conflicting row (column 10, lines 8-15, wherein conflicting updates may occur to different copies of replicated data, and wherein one transaction, T1, can update one copy of record A, C1, and a second transaction can update a second copy of record A,C2, and if T1 is propagated to C2, T1 can overwrite T2 and vice versa, Jain).

Claims 26 and 75:

Regarding claims 26 and 75, Jain teaches wherein determining **a priority for the communicated change** comprises:

assigning priority to the communicated change (REFER to claims 24 and 73, wherein the limitation has been addressed, Jain) **responsive to** the **type of the** communicated change **being a row** delete (column 14, lines 22-26, Jain) and **responsive to,** no row in the target table copy matches key column values **associated with** the communicated change (column 16, lines 15-19, wherein the not equal to it's corresponding value and Figure 2D1, all features, wherein before replication is defined and illustrates Database A and Database B, and wherein the rows aren't matched, Jain); **or**

timestamp associated with of the communicated change is greater than a **timestamp associated with** the conflicting row in the target table copy (columns 18-19, lines 65-67 and lines 1-2, Jain); **or**

the **timestamp associated with** for the communicated change is the same as the **timestamp associated with** for the conflicting row and a copy identification **associated with** the communication change is greater than a copy identification of the conflicting row (column 18, lines 8-10, Jain), and a copy identification of the communication change is greater than a copy identification **associated with** the conflicting row (column 10, lines 8-15, wherein conflicting updates may occur to different copies of replicated data, and wherein one transaction, T1, can update one copy of record A, C1, and a second transaction can update a second copy of record A,C2, and if T1 is propagated to C2, T1 can overwrite T2 and vice versa, Jain).

Claims 27 and 76:

Regarding claims 27 and 76, Jain teaches wherein determining **a priority for the communicated change** comprises:

assigning priority to the communicated change (REFER to claims 24 and 73, wherein the limitation has been addressed, Jain) **responsive to the type of the** communicated change is **being** a non-

key update (column 17,lines 58-59, wherein concurrent updates can be made to non-primary key

columns, Jain) and **responsive to,**

no row in the target table copy matches key column values **associated with** the communicated

change (Figure 2D1, all features, wherein before replication is illustrated as well as defined, Database A

and Database B, the row table aren't matched nor is the communicated change, interpreted to be wherein

the inventory columns are identified, Jain); **or**

a **timestamp associated with** the communicated change is greater than a **timestamp associated**

with the conflicting row in the target table copy (columns 18-19, lines 65-67 and lines 1-2, Jain); **or**

the **timestamp associated with** of the communicated change is the same as the **timestamp**

associated with of the conflicting row and a copy identification **associated with** the communicated

change is greater than a copy identification **associated with** the conflicting row (column 10, lines 8-15,

wherein conflicting updates may occur to different copies of replicated data, and wherein one transaction,

T1, can update one copy of record A, C1, and a second transaction can update a second copy of record A,

C2, and if T1 is propagated to C2, T1 can overwrite T2 and vice versa, Jain).

Claims 28 and 77:

Regarding claims 28 and 77, Jain teaches wherein determining a **priority for the communicated**

change comprises:

assigning priority to the communicated change **responsive to** the **type of the** communicated

change (Figure 6, all features wherein the first call is interpreted to be priority and columns 10-11, line

65-67 and lines 1-5, Jain) **being** a key update (Figure 7A, diagram 714, wherein the queue_call_args in

Figure 6, diagram 618, continues onto Figure 7, wherein the arguments are executed and column 12, lines

6-11, wherein the parameter is updated shown in Figure 7A, diagram 714, Jain) and **if:**

no row in the target table copy matching <u>old key</u> column values **associated with** the

communicated change is identified (Figure 2D1, all features, wherein before replication is illustrated as

well as defined, Database A and Database B, the row table aren't matched nor is the communicated

change, interpreted to be wherein the inventory columns are identified, Jain), and

no row in the target table copy matching new key column values **associated with** the

communicated change is identified (Figure 2D1, all features, wherein after DBB=> DBA replication is

illustrated, and Database B, before the replication and Database A, after replication have the same column

values, i.e. matches, and wherein the headings of item and quantity on hand are identified, the rows are

matched, Jain); **or**

a new **timestamp associated with** of the communicated change is greater than a **timestamp**

associated with for the conflicting row in the target table copy (columns 18-19, lines 65-67 and lines 1-2,

Jain) with key column values matching new key column values of **associated with** communicated change

(Figure 2D1 all features, wherein DBB=>DBA, illustrates a row, wherein DB_B is communicated to

Database A and column 18, lines 1-8, Jain), **or**

the new **timestamp and copy identification associated with** of the communicated change

matches the **timestamp** (column 4, lines 18-21, Jain) and a copy identification **associated with** the

conflicting row in the target table copy with key column values matching new key column values

associated with the communicated change, respectively (column 4, lines 23-31, wherein the procedure-

level replication modifies a remote site based on the logical operations used to modify data at the

originating site, and wherein a procedure-level replication provides the ability to identify conflicting

updates and the same logical operations performed on one copy of a data item can be propagated to all

other copies of the same data item and information concerning conflicts identified by the present

invention can be retained in the replication tables, Jain); **or**

an old **timestamp associated with** the communicated change is greater than the **timestamp**

associated with the conflicting row in the target table copy with key columns matching old key column

values **associated with** the communicated change (column 18, lines 1-8 and Figure 2D1, all features,

wherein before replication is defined and illustrates Database B and after DBB=>DBA replication,

wherein Database B is defined, the row communicated, wherein the modifications are matched in the

local to the remote sites and Database B, Jain); **or**

the **timestamp associated with** the communicated change matches the **timestamp associated**

with the conflicting row and an old copy identification **associated with** the communicated change is

greater than the copy identification (column 10, lines 8-15, wherein conflicting updates may occur to

different copies of replicated data, and wherein one transaction, T1, can update one copy of record A, C1,

and a second transaction can update a second copy of record A, C2, and if T1 is propagated to C2, T1 can

overwrite T2 and vice versa, Jain) **associated with** the conflicting row with key column values matching

old key column values **associated with** the communicated change (column 18, lines 1-8 and Figure 2D1,

all features, wherein before replication is defined and illustrates Database B and after DBB=>DBA

replication, wherein Database B is defined, the row communicated, wherein the modifications are

matched in the local to the remote sites and Database B, Jain); and

no row in the target table copy matching new key column values **associated with** the

communicated change is identified (REFER to claims 23 and 72, wherein this limitation has been

addressed, Jain); **or**

the new monotonic number of the communicated change is greater than the

timestamp associated with of the conflicting row with key column values matching the new key column

values **associated with** the communicated change (column 18, lines 1-8, wherein a row-level replication

scheme determines that a remote site's current values match old values for all columns in a table entry

prior to applying an update at a remote site, wherein the column-level replication checks only those

columns that were changed by the original update, i.e. indicated by a difference between the values of the

corresponding old and new parameters and if the old. value parameters of the changed columns are equal

to their corresponding values at the remote site, the loss of an intermediate update is unlikely, and the

update operation can be completed, Jain); **or**

 the **timestamp associated with** of the communicated change matches the **timestamp associated with** of

the conflicting row and the new copy identification **associated with** the communicated change is greater

than the copy identification **associated with** the conflicting row with key column values matching the

new key column values **associated with** the communicated change (column 25-28, wherein all of the

field values in the remote table entry are equal to their corresponding old_sub_value parameters

processing continues at processing block, Jain).

Claims 29 and 78:

Regarding Claims 29 and 78, Jain teaches wherein changing **the row of the target table copy**

comprises:

 controlling propagation of the changed applied to the target table copy (column 13, lines 62-64,

wherein value changes in the local copy, Jain);

 insuring convergence of the **each** of table **copy in the database system** to the same state (Figure

2B, diagrams 120 and 130 and column 5, lines 45-50, wherein database A and database B contain

identical entries and values for each entry, Jain); and

 installing the communicated **change** into the target table copy (column 5, lines 56-58, wherein

inserting is interpreted to be installing, an entry in the orders table to reflect the order, wherein the process

is reflected in Figure 2B, the one and two of the basic transactions illustrated, Jain).

Claims 30 and 79:

Regarding claims 30 and 79, Jain teaches wherein controlling **propagation of the change**

applied to the target table copy comprises:

 responsive to the type of the communicated change **being** a row insert, setting a copy

identification **associated with** the applied change to the target table copy to a copy identification

associated with the communicated change (Figure 4, diagram 402, wherein the trigger can check the

global variable in the replication procedure or an original procedure, defined in column 13,lines 30-32,

and lines 25-32, wherein setting a global variable, i.e. a variable that can be accessed by an trigger or

replication, and perform replication is interpreted to be receiving the change, Jain).

Claims 31 and 80:

Regarding claims 31 and 80, Jain teaches wherein controlling **propagation of the change**

applied to the target table copy comprises:

responsive to the **type of the** communicated change **being** a row delete, updating a row of the

target table copy with key column values matching key column values **associated with** the

communicated change by setting the delete label to indicate **not** to propagate the applied change

(column 16, lines 10-20, wherein the remote table entry is deleted from the remote table, and wherein

after the delete operation is performed on the remote table entry, the global replication variable is reset at

processing and processing ends, and wherein if, at the decision block, i.e., "should lost updates be

prevented, existing modifications should be preserved, processing continues at decision block, and at the

decision block i.e., "is each field value in the row equal to its corresponding old_sub_value parameter,

and if any of the remote table entry's field values do not equal its corresponding old_sub_value

parameter, processing continues at processing block, Jain).

Claims 32 and 81:

Regarding claims 32, and 81, Jain teaches wherein controlling **propagation of the change**

applied to the target table copy comprises:

responsive to the communicated change **being** a non-key **or** key update, setting a copy

identification **associated with** the applied change to the target table copy to the copy identification

associated with the communicated change (Figure 4, diagram 402, wherein the trigger can check the

global variable in the replication procedure or an original procedure, column 13,lines 30-32, and lines 25-

32, wherein setting a global variable, i.e. a variable that can be accessed by an trigger or replication,

perform replication and column 13, lines 54-62, wherein changes are applied to the table, Jain).

Claims 33 and 82:

Regarding claims 33 and 82, Jain teaches wherein insuring **convergence of each table copy in**

the database system to the same state comprises:

insuring propagation of an implicit delete change in the target table copy by setting a conflict

label of the propagation controls **associated with** the conflicting row when the **type of the** communicated

change is a row insert, row delete, **or** non-key update assigned priority (column 6, lines 53-63, Jain), and

a copy identification **associated with** the conflicting row is a copy identification assigned to the target

table copy (columns 12-14, lines 62-64, wherein replicate value changes in the local copy can be executed

at remote sites to replicate data modifications performed on local data and lines 9-15, wherein identify the

row that is the target of the modification, and wherein the old values would be used to detect conflicts,

Jain).

Claims 34 and 83:

Regarding claims 34 and 83, Jain teaches wherein insuring **convergence of each table copy in**

the database system to the same state comprises:

insuring propagation of a delete change in the target table by setting a conflict label of the

propagation controls **associated with** the conflicting row (column 15, lines 10-20, wherein check is done

to see if modification has been made, and wherein current update operation might be erased is the update

is performed on remote data, and so forth, Jain) with key column values matching old key column values

associated with the communicated change (Figure 5B1, diagrams 534, wherein corresponding is

interpreted to be matching column level, Jain), when the **type of the** communicated change is a key

update assigned priority (Figure 5B1, diagrams 544, wherein update the row such that each filed value is

updated with its corresponding new value, Jain), and a copy identification **associated with** the conflicting

row matches a copy identification assigned to the target table copy (columns 12-14, lines 62-64, wherein replicate value changes in the local copy can be executed at remote sites to replicate data modifications performed on local data and lines 9-15, wherein identify the row that is the target of the modification, and wherein the old values would be used to detect conflicts, Jain); and

insuring propagation of a delete change in the target table copy by setting a conflict label of the propagation controls **associated with** the conflicting row with key column values matching new key column values **associated with** the communicated change, when the **type of the** communicated change is a key update assigned priority, and a copy identification **associated with** the conflicting row is a copy identification assigned to the target table copy (REFER to claims 34 and 83, wherein the following limitations have been addressed, Jain)

Claims 35 and 84:

Regarding claims 35 and 84, Jain teaches wherein insuring **convergence of each table copy in the database system to the same state** comprises:

recording communicated old key column values, an old **timestamp,** and an old copy identification **associated with** a conflicting change in the target table copy in a delete tombstone, when **type of the** communicated change is a conflicting delete <u>or</u> a conflicting update with conflicting communicated old **timestamp** or copy identification (column 20, lines 11-13, wherein save point is defined and interpreted to be a method of recording, column 21, lines 46-49, wherein a save point is being established, Jain).

Claims 36 and 85:

Regarding claims 36 and 85, Jain teaches wherein insuring **convergence of each table copy in the database system to the same state** comprises:

checking for matching delete (column 21 lines 4-8, Jain) and suppressing application of the communication change (Figure 11A2, diagram 1128, and column 20, lines 9-16, wherein modifications

can be undone, Jain) **responsive to** a delete tombstone matching the new key columns (Figure 11A2,

diagram 1127 and column 20, liens 60-64, wherein if they are equal, Jain), new **timestamp**, and new copy

identification **associated with** the communicated change **being** found (column 19, lines 57-63, Jain),

when the **type of the** communicated change is an insert change <u>or</u> an update change with a conflicting

insert assigned priority (column 18, lines 54-57, wherein entry is inserted reflection change in decrease,

Jain).

Claims 37 and 86:

Regarding claims 37 and 86, Jain teaches reporting each conflicting change (column 10, lines 4-

15, wherein exceptions table is used to store information related to any exceptional or occurrence during

executions of a deferred transaction, wherein one transaction, T1, can update one copy of record A, C1,

and a second transaction, T2, can update a second copy of record A, C2. If T1 is propagated to C2, T1

can overwrite T2's update, and vice versa, detects this type of exception, and others, and retains

information <u>for each</u> exception, Jain).

Claims 38 and 87:

Regarding claims 38 and 87, Jain teaches wherein reporting **each conflicting change** comprises:

reporting conflicting changes of a row delete, a row insert, <u>or</u> a non-key update change only when

priority is <u>not</u> assigned to the communicated change (Figure 6, diagram 601, wherein the first call isn't

assign, wherein no is identified, Jain); and

a copy identification **associated with** a conflicting row in a target table copy is the copy

identification assigned to the target table copy (columns 12-14, lines 62-64, wherein replicate value

changes in the local copy can be executed at remote sites to replicate data modifications performed on

local data and lines 9-15, wherein identify the row that is the target of the modification, and wherein the

old values would be used to detect conflicts, Jain).

Claims 39 and 88:

Claims 39 and 88, Jain teaches wherein reporting **each conflicting change** comprises:

reporting conflicting changes of a key update change only when priority is **not** assigned to the communicated change (REFER to 35 and 84, wherein this limitation has been addressed, Jain); and

a copy identification **associated with** a conflicting row in a target table copy with key column values matching old key column values **associated with** the communicated change is the copy identification assigned to the target table copy (column 22, lines 7-14, wherein old and new values as part of its parameters, a potential conflict can be detected by comparing the old values of the row at the original updating site with the current value of the row at the targeted site for the replicated modification, and wherein the values are different, a conflict exists between the local and remote data copies, Jain); **or**

a copy identification **associated with** a conflicting row with key column values matching new key column values **associated with** the communicated change is the copy identification assigned to the target table copy (column 22, lines 13-22, wherein f the values are different, a conflict exists between the local and remote data copies, wherein the order processing example described includes a error detection, wherein the order processing for example, the place order remote process includes examination of the local and remote copies of the order status and the ability for an application to identify conflicts within one of its procedures, Jain).

Claim 40:

Regarding Claim 40, Jain teaches wherein **a plurality of nodes each node having a corresponding copy of a table** (see abstract, Jain), wherein each row of **each table copy includes:**

a timestamp with the row indicating a time when a change to the row has occurred (Figure 10, wherein commit time is defined and wherein, commit is interpreted to be the point in a transaction when all updates to any resources involved in the transaction are made permanent, Jain);

a copy identification to the row, the copy identification being an identifier that uniquely

identifies the table copy to which the row belongs (Refer to claim 1, wherein this limitation has already

been addressed, Jain); and

propagation controls with the row, the propagation controls indicating whether a change to

the row should be communicated to other table copies based at least in part on the timestamp of the

change or the copy identification associated with the row (Refer to claim 1, wherein this limitation has

already been addressed, Jain);

a mechanism to asynchronously capture a change to a row of a given table copy in the

database system from a database recovery log, the database recovery log containing an entry that

describes the change to the row of the given table copy (Refer to claim 1, wherein this limitation has

already been addressed, Jain) the database recovery log containing an entry that describes the change

to row of the given table copy;

a message queue for communicating the captured change to other table copies in the database

system (column 4, lines 1-4 and lines 14-15, Jain); and

a mechanism to apply the communicated change to the other table copies in the database

system, wherein each table copy in the database system converges to a same state (Refer to claim 1,

wherein this limitation has already been addressed, Jain).

(10) Response to Arguments

Applicant Argues:

First, the limitation "at least in part" is clear on its own terms as set forth in the claim. In particular, claim 1 recites a method that includes (for each row of the table copy) associating a timestamp with the row, associating a copy identification with the row, and associating propagation control with the row. The propagation controls indicate whether a change to the row should be communicated to other table copies based at least in part on the timestamp of the change or the copy identification associated with the row.

That is, the propagation control utilizes the timestamp of the change or the copy identification associated with the row to indicate whether a change to the row should be communicated to other table copies.

Second, the claims and the specification provide support for such limitation...Accordingly, the ImplicitDelete flag 204 is set based on the time stamp of a change to the row or the copy identification assigned to the row. Similarly, the CopyDelete flag 203 is set based on a copy identification of a row to prevent propagation of a row delete to other table copies.

Examiner Responds:

Examiner is not persuaded. The meanings of vague, indefinite, particularly, and distinct as defined in the American Heritage College Dictionary are presented below:

- vague: not clearly expressed; inexplicit
- indefinite: not definite; unclear, vague
- particularly: to a great degree
- distinct: clearly defined; unquestionable

It is required by statute that the specification of an application for patent shall conclude with one or more claims that particularly point out and distinctly claim the subject matter which the Applicant regards as his/her invention. In order for the Applicant to particularly point out and distinctly claim the subject matter which the Applicant regards as his/her invention, the Applicant must present a claim which is **clearly defined to a great degree**. This is something the Applicant has failed to do with respect to the instant application.

The Examiner respectfully disagrees with the Applicant that the phrase "at least in part" is clear on its own terms as set forth in the claim. The phrase "at least in part" by its vary nature is vague and indefinite because it does not define to a great degree the role played by the timestamp of the change or the copy identification associated with the row in the process of indicating whether a change to the row should be communicated to other table copies as set

forth in Applicant's claim 1 and 50.   Because the phrase "at least in part" <u>does not define to a</u>

<u>great degree the role</u> played by the timestamp of the change or the copy identification

associated with the row in the process of indicating whether a change to the row should be

communicated to other table copies as set forth in Applicant's claim 1 and 50, the <u>role played by</u>

<u>these features</u> in indicating whether a change to the row should be communicated <u>is in fact in</u>

<u>question</u> and <u>not clearly expressed</u>.

The phrase "at least in part", by its very usage in the claim language, renders the claim

indefinite because it describes the invention in such a way that the roles played by key elements

of the claimed invention set forth above are in fact <u>unclear</u> and <u>questionable</u>. Since the exact

role of key elements of the claim language are in fact unclear, questionable, vague, and

indefinite, the Examiner requests that the rejections under 35 U.S.C. 112 second paragraph be

sustained.

Applicant Argues:

Jain fails to disclose asynchronously capturing a change to a row of a given table copy from a
database recovery log as recited in claim1.
However, unlike these prior art systems, Jain encodes propagation information directly in tables in
the database system. That is, the tables themselves contain all the information necessary to replicate a
data modification to other data sites (col. 7, lines 28-38).
In rejecting claim 1, on page 5 of the Action mailed September 29, 2006, the Examiner cites
column 7, lines 7-36 which teaches the redo log. As discussed above, the redo log, however, corresponds
to prior art methods in which changes are made only to a master copy, and then transmitted to slave
copies.
The Examiner has not established anticipation under 35 U.S.C. 102.

Examiner Responds:

Examiner is not persuaded. The Examiner asserts that each and every element of the

Applicants claimed invention is either disclosed or suggested by the prior art of record.

Therefore, the Examiner has indeed established anticipation under 35 U.S.C. 102. The Jain

reference discloses asynchronously capturing a change to a row of a given table copy from a

database recovery log at column 7, lines 7-36 of the Jain reference. Further comments as to how

this passage is equivalent to the Applicant's claim limitation can be found in the reference

citation on pages 6-7 of the this Examiner's Answer. Since it appears that each and every

element of the Applicant's claimed invention is either disclosed or suggested by the prior art of

record, the Examiner requests that the rejections under 35 U.S.C. 102(b) be sustained.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the Examiner in the Related Appeals
and Interferences section of this Examiner's Answer.

Conclusion

For the above reasons, it is believed that the rejections should be sustained.
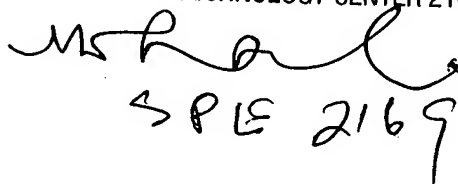
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